

Claims

1. Magnetic measurement probe for the aquisition of magnetization data of a magnetic item (7), in particular a security document or article comprising at least one magnetic printing or coating, said measurement probe comprising at least one magnetizing coil (3), characterized in that at least two magnetic sensors (4s, 4c, 8s ,8c) are disposed inside said magnetizing coil (3), at its both ends, respectively, and having their magnetic axes substantially aligned with the magnetic field inside the coil (3).
2. Magnetic measurement probe according to claim 1, characterized in that said magnetizing coil (3) is a magnetic core free coil.
3. Magnetic measurement probe according to any one of claims 1 or 2, characterized in that said magnetizing coil (3) is a cylinder coil.
4. Magnetic measurement probe according to any one of claims 1 to 3, characterized in that said magnetic sensors are induction sensors in the form of a sensing coil (4s) and a compensating coil (4c), respectively, wherein the outer diameters of said sensing coil (4s) and compensating coil (4c) are smaller than the inner diameter of said magnetizing coil (3).
5. Magnetic measurement probe according to any one of claims 1 to 3, characterized in that said magnetic sensors are magnetic field sensors in the form of a sensing component (8s) and a compensating component (8c), respectively, wherein the outer diameters of said sensing component (8s) and

compensating component (8c) are smaller than the inner diameter of said magnetizing coil (3).

6. Magnetic measurement probe according to one of claims 1 to 5, further comprising a probe holder (70) for keeping item (7) in an appropriate position and distance with respect to the magnetizing coil 3 and the sensors (4s, 4c; 8s, 8c), such that the magnetic material M within the detection area of said magnetic sensors is in a magnetic field region ( $H_3$ ) of said magnetizing coil (3) where the magnetic field strength does not deviate more than 15 %, preferably 10%, from its value ( $H_1$ ) inside said magnetizing coil 3.
7. Magnetic measurement probe according to one of claim 1 to 6, characterized in that it comprises a sample support made of non-magnetic material of low electric conductivity.
8. Method for measuring magnetization characteristics of at least part of an item (7), specifically a security document or article, said item (7) comprising at least one magnetic security material (M), said method being characterized by the steps of:
  - a) positioning a measurement probe (P) according to any one of the claims 1 to 7 on said item (7), such that said material (M) is within the region  $H_3$  of practical field homogeneity of the probe's magnetizing coil (3),
  - b) applying by means of said magnetizing coil (3) at least one value of a magnetic field to the item (7), and
  - c) measuring at least one value of magnetic characteristic of said material (M), using said magnetic sensors (4s; 4c; 8s; 8c).

9. Method according to claim 8, wherein the corresponding magnetization value  $B$  ( $V_s$ ) of said material (M) is measured upon applying at least one value of magnetic field  $H$  to said material (M).
10. Method according to claim 8, wherein the corresponding induction value  $dB/dt$  ( $V_s$ ) of said material (M) is measured upon application of a magnetic field variation  $dH/dt$  for at least one value of magnetic field  $H$  to said material (M).
11. Method according to one of claims 8 to 10, characterized in that said item (7) is placed on a probe holder (70).
12. Authentication device for authenticating at least one item (7), specifically a security document, said item (7) comprising at least one magnetic security material (M), said authentication device comprising:
  - a) a measurement probe according to any one of claims 1 to 7, together with corresponding driving and sampling electronics,
  - b) a processing device (1) with implemented algorithm for driving said probe and sampling, digitizing, processing and comparing magnetic characteristic values,
  - c) at least one memory device (1c, 1d) for storing sample and reference magnetic characteristic values.
13. Authentication device according to claim 12, further supporting a "learning mode" for acquiring and storing reference magnetic characteristics of a magnetic reference item (7R), and a "testing mode" for acquiring, storing and comparing sample magnetic characteristics from a sample item (7), to derive an authenticity signal.

14. Authentication device according to any one of claims 12 or 13, further comprising data transfer means for performing said comparison of the measured magnetization data of the sample with corresponding previously stored reference values and deriving said authenticity "yes/no" indicator at a remote place and for transmitting back said authenticity indicator to the site of authentication.
15. Method for authenticating a security document or article, carrying a thin layer of magnetic material, by the means of an authentication device according to any one of claims 12 to 14, said method comprising the steps of
  - a) providing, in a digital memory, magnetic characteristic values of a magnetic reference item, as reference data;
  - b) providing a security document or article to be authenticated, said security document or article comprising a thin layer of magnetic material in or on at least part of its surface;
  - c) acquiring into a digital memory, using said authentication device according to any one of the claims 12 to 14, magnetic characteristic values of said document or article provided in step (b);
  - d) processing the digital data acquired in step (c) to correct them for measurement-related circumstances;
  - e) comparing the data obtained in step (d) with the corresponding stored reference data provided in step (a), using a predefined comparison algorithm and a predefined tolerance criterion, hereby deriving an authenticity "yes/no" indicator.
16. Method according to claim 15, wherein said reference data are acquired by the means of an authentication device according to any one of claims 12 to 14.